Two Years of High-Resolution Airborne Imagery and Value-Added Products for the Barrow Environmental Observatory

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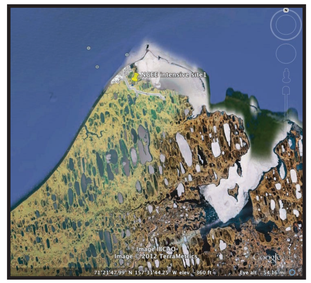
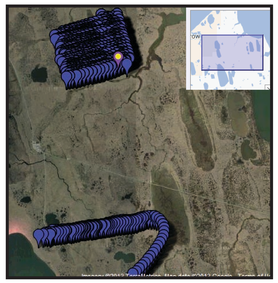
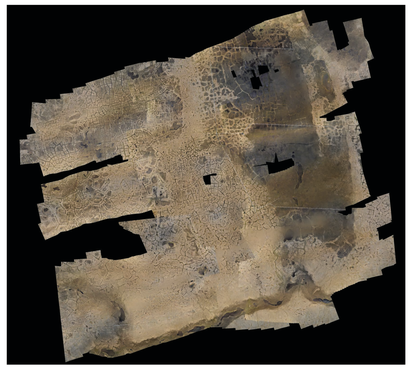
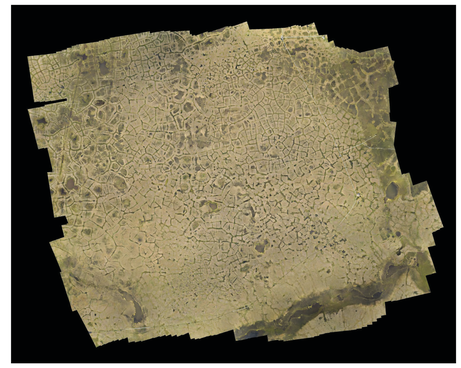
Optical and thermal infrared imagery were collected by UAF at the Arctic NGEE Intensive sites in 2012 and 2013







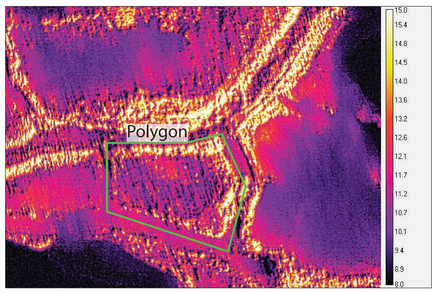


Observation dates were July 4, 2012 and August 7, 2013

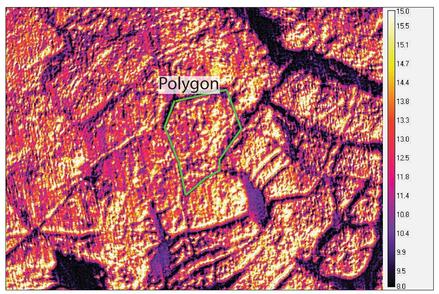
Flights occurred at about 100 m AGL and raw resolution is around 4 cm for the RGB images. There are clear differences between the vegetation productivity and surface moisture inundation at these two different sampling times. New *in situ* sensors were also installed between flight missions and the photos show useful 'before and after' imagery.

July 4, 2012

August 7, 2013



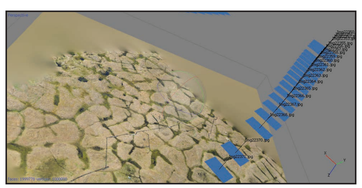
Low Centered

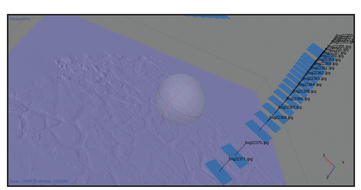


High Centered

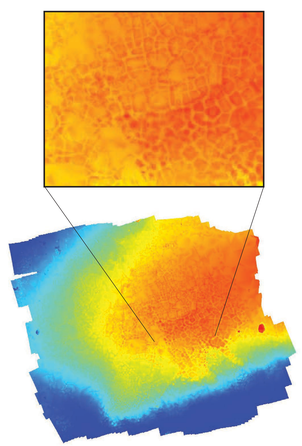
The thermal IR imagery makes it possible to characterize the microclimate of the landscape in a variety of ways: here low centered and high centered polygons are shown to have completely different spatial distributions of skin temperature.

Value-added products are being generated from the imagery





The structure from motion technique (left figures) has been used to generate the 2D orthomosaics above and now for a digital surface model (DSM) to the right. The model accuracy here depends on the distribution of ground control points (GCPs). We anticipate additional surveying in 2014 to remove the bowling effect of unequally spaced GCPs in the DSM shown here.



Data fusion for informing Earth System models

To combine detailed airborne snapshots of microclimate with *in situ* and satellite-derived time series of skin temperatures is the ultimate goal. These data are valuable both for examining the scaling of land-atmosphere interactions as well as time-space variations. The cartoon to the right illustrates the relationships between microtopography and microclimates on a variety of scales in this data fusion framework. We anticipate these products will be used for model development and evalutation.

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